

Partnership Development: Markets, Applied Research and Data Sharing Networks

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Today

- Enzyme Cost Reduction
- Biomass Compositional Analysis
- Partnership Development
- ESP Feedback
- Advanced Pretreatment Feedback
- ESP Concluding Remarks
- Advanced Pretreatment Concluding Remarks
- Tours

Partnership Topics for Today

- Markets, Prices and Co-Location Options
- New Sugar Platform CRADAs & Partnerships
- Facilitating Methods Sharing & Development of Tools for the Emerging Biorefineries

Markets, Prices and Co-Location Options

- As follow-up to the Sugar Platform Jan 2002 Gate Review, we were asked to look in detail at three sets of issues relevant to the planning for future Sugar Platform activities:
 - What are the impacts of proposed public policy decisions and initiatives on the potential markets for ethanol?
 - What are the potential impacts of the changing markets on the future prices for ethanol (and corn)?
 - What impacts will co-location of cellulosic ethanol plants with coal-fired power plants have on process economics?

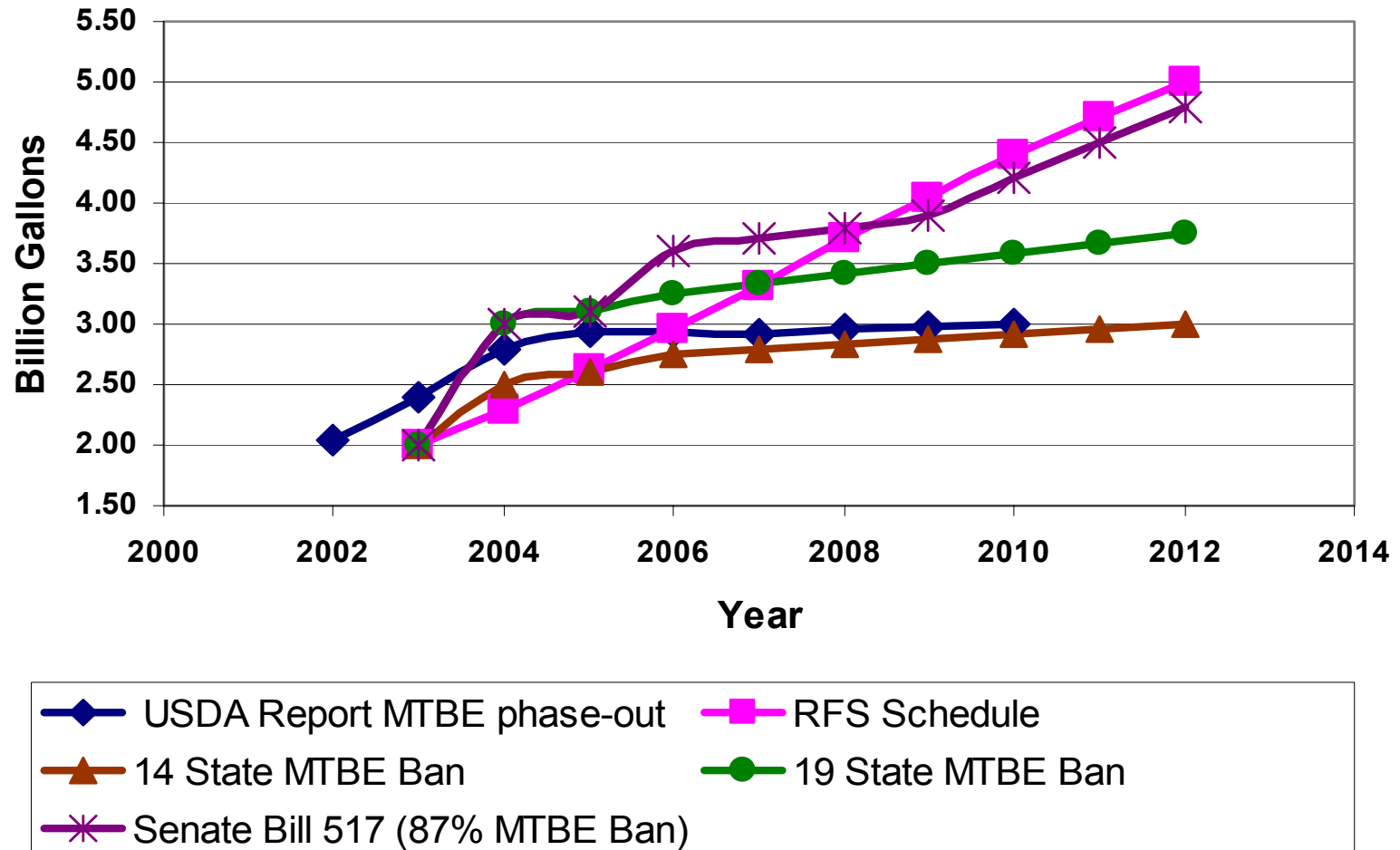
Current Federal & State Initiatives that may Affect Ethanol Production & Price Trends

- Phase-out of MTBE
 - California
 - Up to 19 other states as well
- Renewable Fuels Standard – RFS
 - Applies to the pool of all highway fuels
- Eliminate of RFG oxygen mandate
- Reduction in sulfur for diesel & gasoline

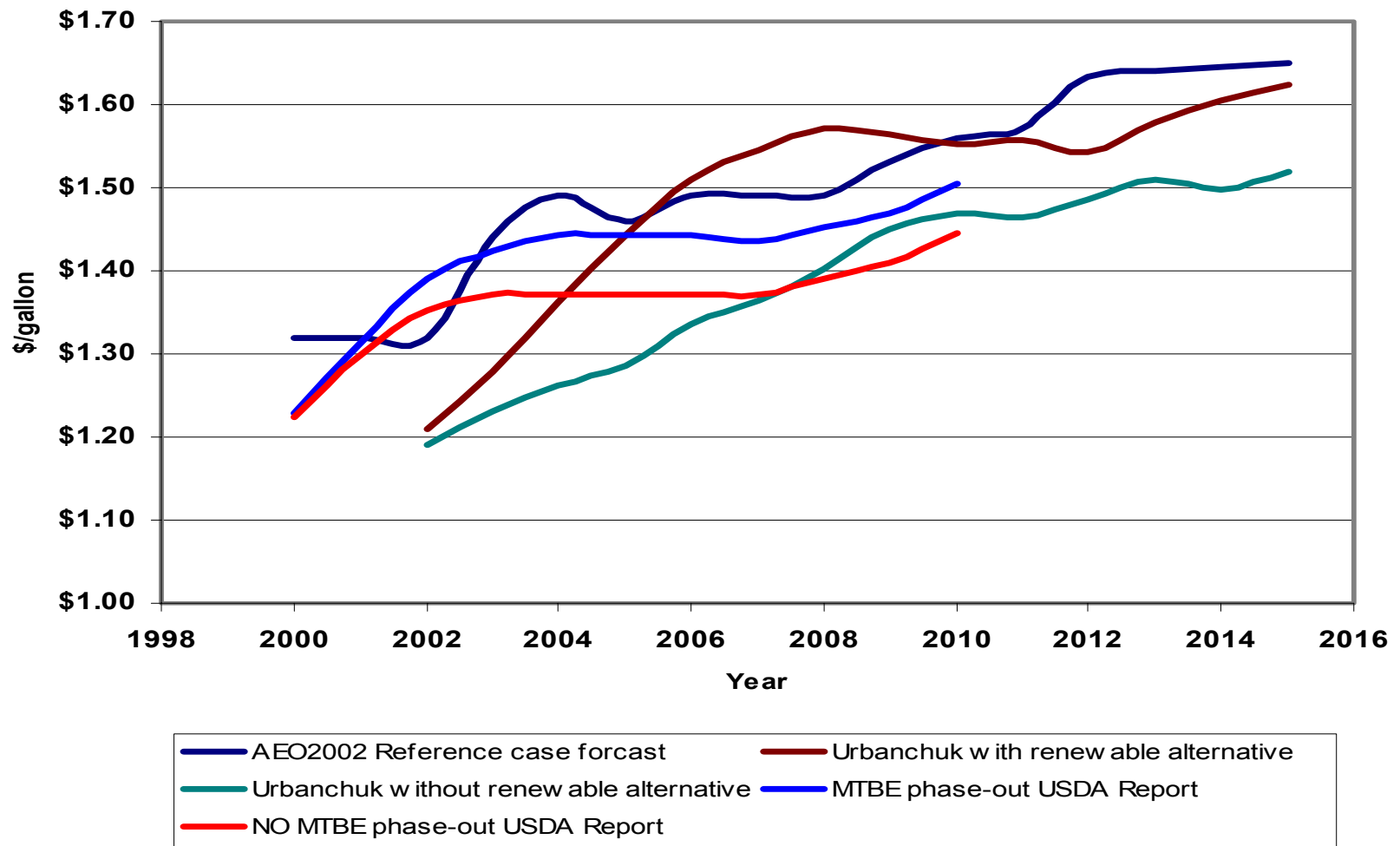
U.S. Ethanol Markets Under Various Scenarios, 2003 – 2012

- Demand is expected to grow rapidly, even under base line case
- MTBE phaseout will drive sharp rise in demand – particularly if East Coast states join California & those who have already outlawed or phased out MTBE
- Renewable Fuels Standard only drives ETOH demand in outyears – after 2008

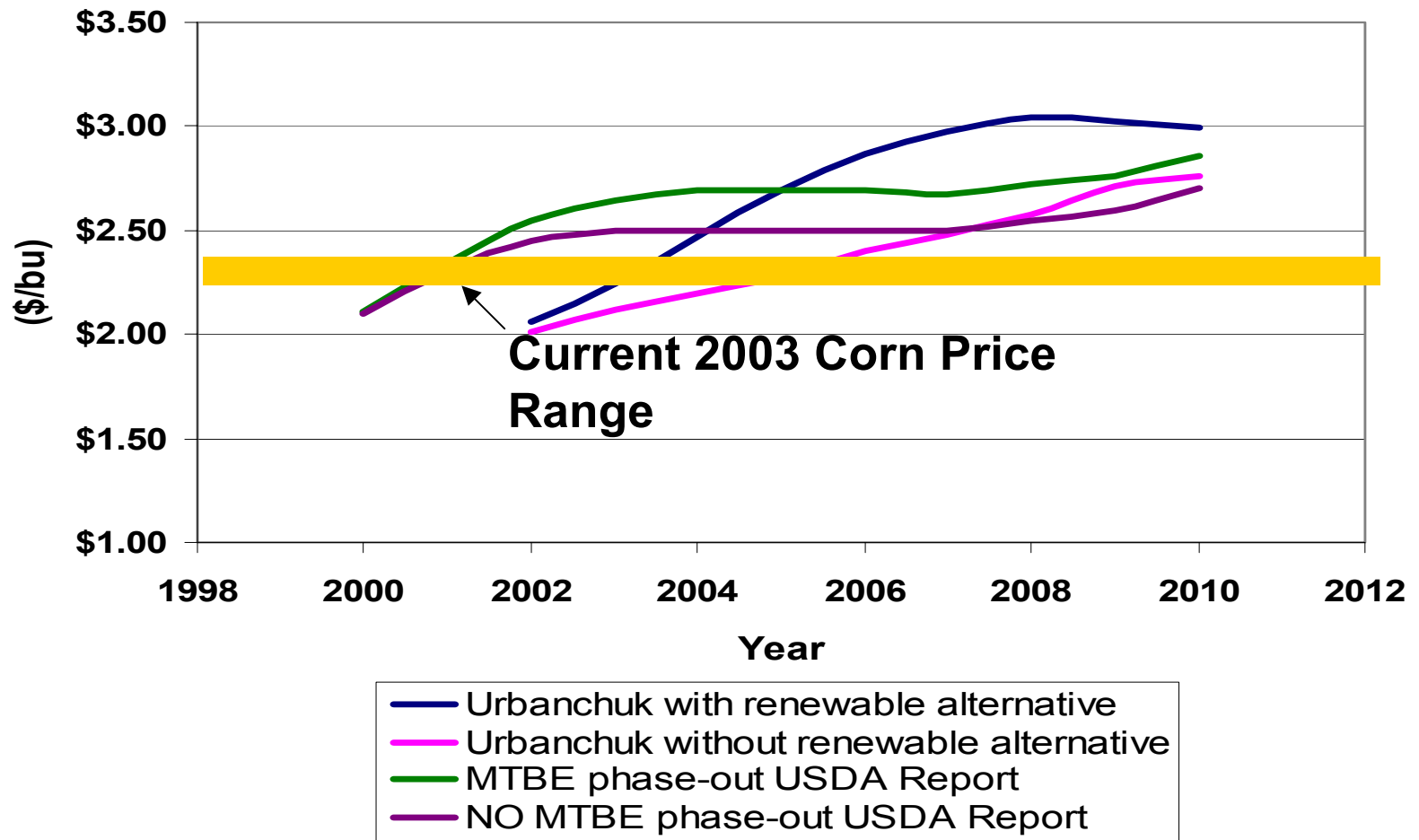
MTBE Phaseout will be Primary Driver for Ethanol Demand



Ethanol Prices Rise More Sharply w/ MTBE Phaseout & RFG Enactment



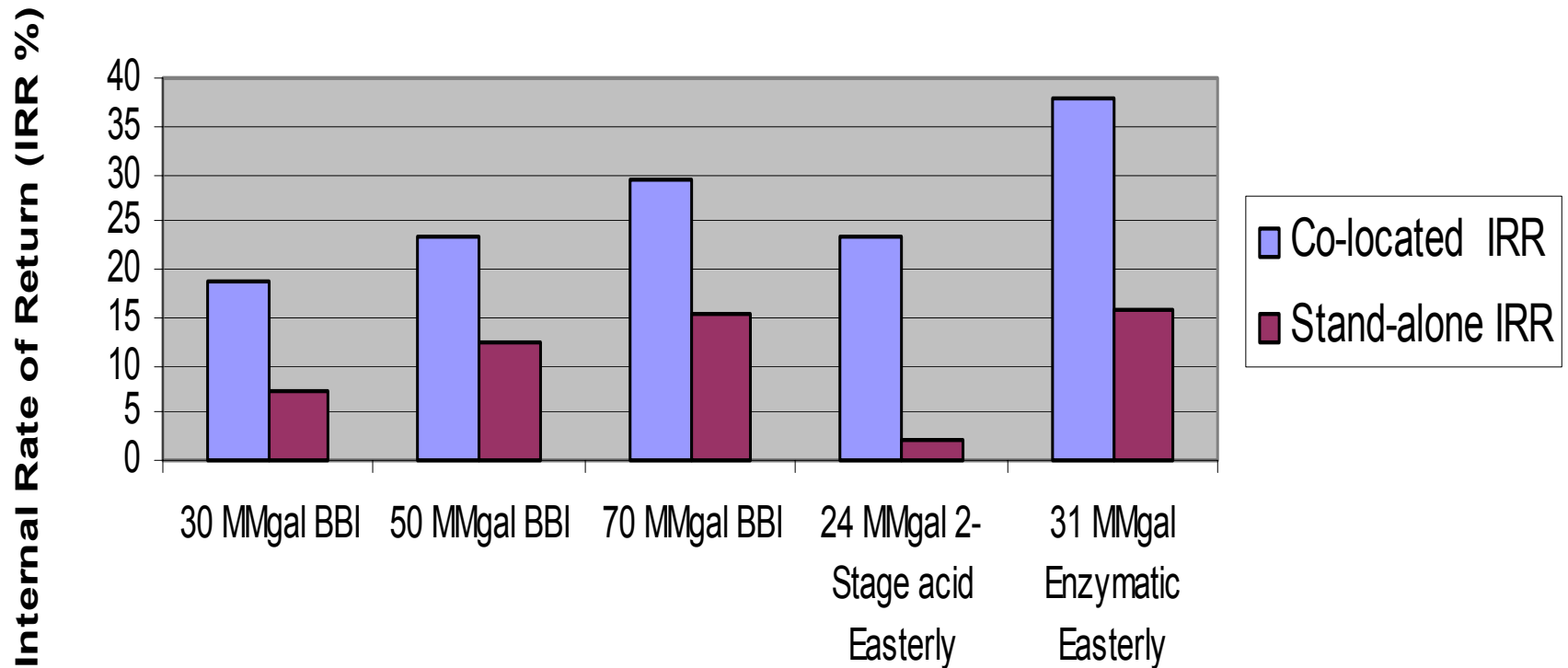
U.S. Corn Prices under Different Scenarios



Co-Location Advantages

- Reduced capital costs by using the combustor/boiler of the coal-fired or biomass-fired power plant
- The lignin residue fuel reduces SO_x and GHG particulate emissions & coal purchase costs
- Electricity, steam, waste water treatment & other operating expenses can be shared

Impacts of Possible Co-Location of Cellulosic Ethanol Plant w/Coal Fired Power Plant



BBI: \$1.21/gallon Ethanol Selling Price

Easterly: \$1.30/gallon Ethanol Selling Price

New Sugar Platform Partnerships for 2003 - 2007

- **Broin & Associates** – 2nd generation dry mill Biorefinery
 - **Cargill** -- A New Biorefinery Platform Intermediate
 - **Cargill-Dow** – Making the Biorefinery Happen
 - **Dupont** – The integrated Corn-based Biorefinery
 - **High Plains** – Advanced Biorefining of Distiller's Grain and Corn Stover Blends
 - **NCGA & Archer-Daniels Midland** -- Separation of Corn Fiber and Conversion to Fuels and Chemicals
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- **Iowa Corn Promotion Board** -- Value Added Products from Hemicellulose Utilization in Dry Mill Ethanol Plants
 - **Iowa Corn Promotion Board** -- Continuous Isosorbide Production from Sorbitol Using Solid Acid Catalysis
- Others will emerge from the pending USDA-DOE Biomass R&D FY 2003 Solicitation***

Emerging Partnerships: The Biomass Rapid Analysis Network (BRAN)

- An industry-focused, self-supporting network to accelerate the development & use of standardized rapid analysis methods for biomass
- BRAN would provide specialized training, technical assistance, new methods development for members
- BRAN would include industrial partners, instrument manufacturers, software developers, and the biomass research community

Next BRAN Steps

- Locate partners willing to make firm commitment to helping fund and direct BRAN's evolution
- Create Board of Directors for policy direction
- Select initial training & technical assistance directions, based on interest of initial members
- Develop training curriculum and initial training schedule
- Run pilot training sessions in Colorado

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